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(Schäfer) nor synapse (Foster) are in very wide use at present.) Generally, however, the book shows that the authors had in mind the immature student, as when they state that "the surface area of all the red corpuscles of the blood is 3,000 sq. meters or approximately four times the size of a baseball diamond." On the whole it is a book excellently adapted to its purpose, and in its present form it can be still more widely used.

F. T. LEWIS.

ZOOLOGY

The Nervous System of Vertebrates.¹—Bell's discovery that the dorsal roots of spinal nerves in vertebrates are sensory and the ventral roots motor in function may be said to be the first step in subdividing the nervous organs of these animals into physiological regions. This process has been very much extended recently especially by certain American neurologists with the result that the nerves and central organs of vertebrates have come to be considered as aggregations of elementary systems of fibers essentially homogeneous from a physiological standpoint. The observations upon which this conception is based are contained for the most part in special papers and have not heretofore been collected and condensed into a single readable account. Such an account has been attempted by Johnston in his text-book on the vertebrate nervous system.

The introductory chapters of this work treat of the morphology, development, and physiology of the nervous system, after which its parts are dealt with, not as in most text-books from the topographical standpoint, but from that of physiological components.* Chapters are devoted in sequence to the somatic afferent division as represented by the nervous mechanism concerned with touch, the lateral line organs, and the ear; to the visceral afferent division as represented by the visceral sensory apparatus and the organs of taste; to the somatic motor division controlling the skeletal musculature; and to the visceral afferent division concerned with the visceral musculature, etc. These chapters are followed by others dealing with special centers: the cerebellum, mesencephalon, diencephalon, and cerebral hemispheres.

¹ Johnston, J. B. *The Nervous System of Vertebrates*. P. Blakiston's Son & Co., Philadelphia, 1906, xx + 370 pp., 180 illustrations.

Although this method of subdividing the nervous organs and classifying their parts has many points of advantage over the older topographical method, it possesses as elaborated by Johnston its weaknesses and these are most clearly seen in the way in which certain organs of special senses are dealt with. The eye and its nervous connections are put in the somatic afferent division not because they are concerned with touch or any of the derived senses, but because in certain of the lower vertebrates the spinal nerve terminals are stimulated apparently by light. The olfactory apparatus is classed under the visceral sensory division because it is concerned with the acquisition of food. The weakness of this classification is apparent from the fact that the reasoning by which the author is led to assign the olfactory apparatus to the visceral sensory division, if applied to the optic apparatus, would bring these organs under that head instead of under the somatic sensory. In a similar way the organs of taste ought not to be classed as visceral sensory organs but as a somatic sensory mechanism, for the reason that the cutaneous sensory nerves of the lower vertebrates are stimulated by sour and salt substances much as our organs of taste are. In other words the classification proposed by Johnston and others, though avowedly physiological, will not stand the test of even the most elementary physiological facts. This state of affairs is probably due to the common practice of certain neurologists of assigning physiological significance to a part on the basis of purely morphological considerations and without once endeavoring to ascertain by experiment the real function of the part concerned. A detailed classification based upon such a method as this is bound to be erroneous and as in this movement the classification epitomizes results, a complete change of method must be inaugurated before sound conclusions can be arrived at. Johnston's book, though a praiseworthy effort, is characterized rather by an enthusiasm for a novel system of classification than by an appreciation of the weaknesses of this system.

G. H. PARKER.

The Sense of Touch in Mammals and Birds.¹—The title of this volume is too inclusive, as is stated by its author in the introduction. It is essentially an anatomical account of epidermal markings and the papillae of the corium; other tactile organs are not considered. The first part of the book discusses palms and soles macroscopically.

¹ Kidd, Walter. *The Sense of Touch in Mammals and Birds*. London, Adam and Charles Black, 1907. 176 pp., 164 figs. Also The Macmillan Co., New York. \$2.00.